

Self-Aware Aerospace Vehicle Contingency Management, Phase I

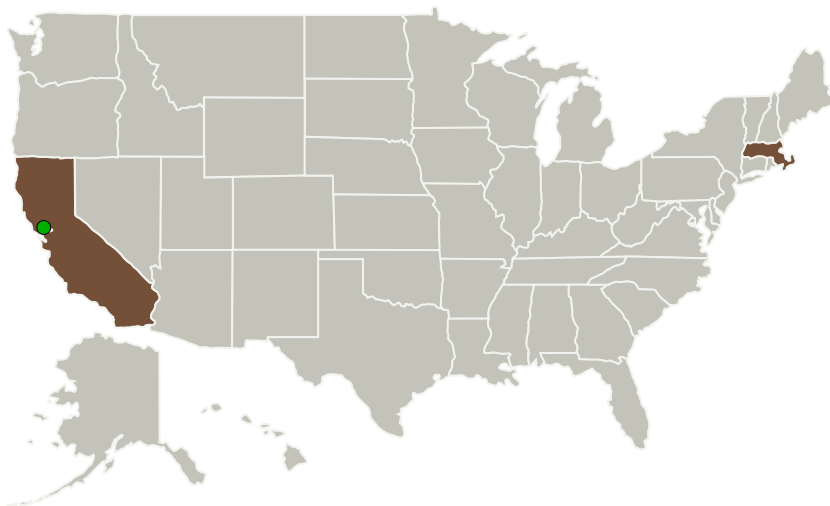
Completed Technology Project (2012 - 2012)



Project Introduction

Aurora Flight Sciences, with Agent Oriented Software, proposes to develop a contingency management system that dynamically performs decision-making based on both sensed and predictive information to carry out adaptive missions and maintenance. This system will mirror the human nervous system, having sensing capabilities distributed throughout systems and subsystems measuring characteristics that predict the conditional response of the aerospace vehicle. The vehicle 'nervous system' of embedded distributed sensors and reasoning agents will generate real-time information on vehicle condition. Like a nervous system, each subsystem will communicate with a higher-level system-reasoning agent. The central reasoning agent will manage mission control systems to perform adaptive maneuvers informed by this network of sensors. This program will concentrate on the composite airframe structure as the system of interest and will encompass the following areas: 1. Assignment of airframe capability figures to maneuvering limits (i.e. various maneuvers that load the airframe, coupled with the capability of the airframe to take that loading). 2. Analysis of available inputs including the environment (temperature, altitude, humidity), the structural state (damage type, size and location), and the loading (inertia, pressure profiles). 3. Creation of an algorithm to determine the capability of the airframe, and potentially return the viability of performing different maneuvers. A safety factor may also be returned, which could be used to determine alternate safe maneuvers. 4. Mission decisions based on whether the airframe can safely perform the required maneuvers, and if not, what maneuvers can be performed that would still enable it to satisfy the mission.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
● Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations	
California	Massachusetts

Project Transitions

▶ **February 2012:** Project Start

✓ **August 2012:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/138488>)

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

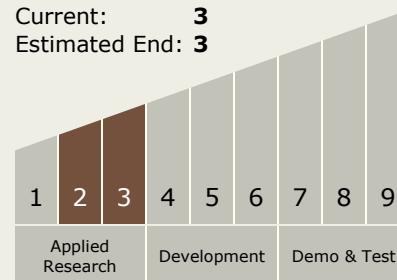
David N Kordonowy

Co-Investigator:

David Kordonowy

Technology Maturity (TRL)

Start: 2
Current: 3
Estimated End: 3



Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
 - TX11.4 Information Processing
 - TX11.4.2 Intelligent Data Understanding

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Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System